DOCKET NO: 288261US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
JEAN-FRANCOIS STUMBE, ET AL.	: EXAMINER: DOLLINGER, MICHAEL M.
SERIAL NO: 10/575,342	:
FILED: APRIL 11, 2006	: GROUP ART UNIT: 1796
FOR: HYPERBRANCHED POLYMERS HAVING ETHYLENICALLY UNSATURATED GROUPS	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated May 10, 2010. A Notice of Appeal was timely filed on October 8, 2010.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF SE (formerly BASF AKTIENGESELLSCHAFT), having an address of Ludwigshafen 67056, Germany.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

Claims 1-17 stand twice rejected and are herein appealed.

IV. STATUS OF THE AMENDMENTS

An Amendment under 37 CFR 1.116, filed September 10, 2010, is in the record.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

It is preliminarily noted that references in brackets are to page and line number of the specification as filed.

Independent Claim 1 provides a hyperbranched [page 10, lines 32-35] polyester [page 1, lines 1-15] comprising

ethylenically unsaturated groups [page 10, lines 10-12], obtained by a method, comprising:

(c) reacting at least one compound [page 6, line 27 to page 9, line 28] having at least one ethylenic double bond with at least one hyperbranched polyester to obtain the hyperbranched polyester comprising ethylenically unsaturated groups, wherein

the at least one compound having at least one ethylenic double bond is bonded to the hyperbranched polyester [page 10, lines 10-18], and

the hyperbranched polyester is obtained by condensing;

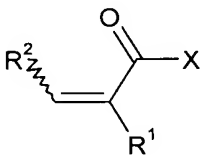
(a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol [page 2, lines 25-26]; or

(b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol [page 2, lines 30-31],

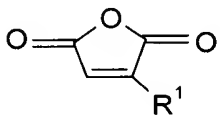
wherein

a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5 [page 6, line 2].

Claim 3 provides the hyperbranched polyester comprising unsaturated groups as claimed in claim 1, wherein the at least one compound having at least one ethylenic double bond is a compound of the formula Ia or Ib [page 6, line 34, bridging to page 7]



Ia



Ib

wherein:

R^1 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, and hydrogen;

R^2 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, C_2-C_6 alkenyl, COOH, and hydrogen;

X is selected from halogen and OR^3; and

R^3 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, C_1-C_{10} alkyl, unbranched or branched, with at least one functional group,

polyethylene glycol derivatives, polypropylene glycol derivatives, glycidyl, H-CO (formyl), unbranched or branched C_1-C_{10} alkyl-CO, and C_6-C_{10} aryl-CO.

Claim 4 provides the hyperbranched polyester comprising unsaturated groups as claimed in claim 1, wherein the at least one compound having at least one ethylenic double bond is selected from the group consisting of [page 8, line 5 to page 9, line 23]:

unsaturated carboxylic acids having 3 to 30 carbon atoms and from 1 to 5 C-C double bonds;

unsaturated alcohols having 3 to 40 carbon atoms and from 1 to 5 C-C double bonds;

unsaturated amines having 3 to 20 carbon atoms and from 1 to 5 C-C double bonds;

diol and polyol ethers in which at least one hydroxyl group is etherified with an unsaturated alcohol and at least one hydroxyl group is unetherified;

diol and polyol esters in which at least one hydroxyl group is esterified with an unsaturated acid and at least one hydroxyl group is unesterified;

vinyl esters, diene and triene monoepoxides;

unsaturated halides having 2 to 20 carbon atoms and from 1 to 5 C-C double bonds,

isocyanato (meth)acrylates; and

unsaturated halogenated silanes.

Claims 2-4 depend from Claim 1 and stand or fall with the independent claim.

Claim 5 provides a process for preparing the hyperbranched polyester comprising unsaturated groups as claimed in claim 1, which comprises synthesizing at least one hyperbranched polyester by condensing [page 10, line 41]:

a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol [page 11, lines 1-2]; or

b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol [page 11, lines 6-7];

and then reacting the synthesis product with (c) at least one compound having at least one ethylenically unsaturated double bond [page 11, lines 9-10],

wherein

a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5 [page 6, line 2].

Claim 6 provides a process for preparing the hyperbranched polyester comprising an unsaturated group as claimed in claim 1, which comprises synthesizing at least one hyperbranched polyester by condensing [page 10, line 41]:

a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol [page 11, lines 1-2]; or

b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol [page 11, lines 6-7];

in the presence of (c) at least one compound having at least one ethylenically unsaturated double bond [page 11, lines 24-25],

wherein

a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5. [page 6, line 2].

Claim 14 provides the hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein a polydispersity is from 1.05 to 50 [page 10, line 22].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Ground A

Claims 1-5, 7-13, 15 and 16 are twice rejected under 35 U.S.C. 102(b) as being unpatentable over Saitoh et al. (U.S. 5,566,027).

Ground B

Claims 1, 2, 5, 7-13 and 15-17 are twice rejected under 35 U.S.C. 102(b) as being unpatentable over Meixner et al. (U.S. 4,983,712).

Ground C

Claims 3 and 4 are twice rejected under 35 U.S.C. 102(b) or in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Meixner et al. (U.S. 4,983,712).

Ground D

Claim 6 is twice rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al. (U.S. 5,566,027).

Ground E

Claim 6 is twice rejected under 35 U.S.C. 103(a) as being unpatentable over Meixner et al. (U.S. 4,983,712).

Ground F

Claim 14 is twice rejected under 35 U.S.C. 103(a) over Saitoh in view of Overbeek et al.(WO 02/32982).

Ground G

Claim 14 is twice rejected under 35 U.S.C. 103(a) over Meixner in view of Overbeek et al.(WO 02/32982).

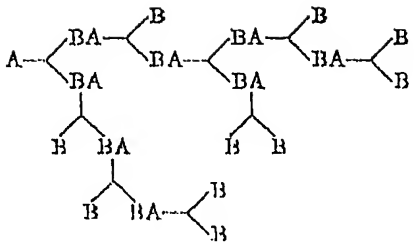
VII. ARGUMENT

Ground A

Rejection of Claims 1-5, 7-13, 15 and 16 under 35 U.S.C. 102(b) over Saitoh et al. (U.S. 5,566,027).

Claims 1-4, 7-13, 15 and 16

The claimed invention provides a hyperbranched polyester comprising ethylenically unsaturated groups, obtained by reacting at least one compound having at least one ethylenic double bond with at least one hyperbranched polyester. Appellants submit that a "hyperbranched" polymer is recognized by one of skill in the art to be a structure having highly branched structures of extending and further branching limbs. The theoretical basis of such structures was described by Flory (Appendix A) and Sunder (Appendix B) and various types of hyperbranched structures have been described. See, for example Ranby et al. (Appendix C); Hult et al. (Appendix D) and Sorensen et al. (Appendix E). Appellants submit that as originally described by Flory in Fig. 1, a hyperbranched polymer is a polymer having extensive branch on branch structure.



Appellants especially note Figures 1, 4 and 5 of Ranby which shows formulae representing the structure of hyperbranched polymers. Hult and Sorensen show similar diagrams and in each case, Appellants submit that one of ordinary skill in organic chemistry, would recognize that to form a hyperbranched structure requires a trifunctional or higher functionality monomer in each repeating unit of the polymer and a specific control of monomer concentration and functional group equivalency.

Appellants have noted that preparation of the dendrimeric structures as cited by Ranby, Hult and Sorensen is inconvenient and lacking in flexibility (page 2, lines 5-7) and have surprisingly discovered that hyperbranched polyesters containing unsaturated groups, which are molecularly and structurally nonuniform, according to the present invention are useful as binders.

The hyperbranched polyester according to the invention is obtained by condensing at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or by condensing at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol. In either method, a trifunctional or higher functionality monomer is involved with each chain extension and thus, in each extension, an opportunity for polymer branch formation is present. In either method **a molar ratio of hydroxyl groups** of the at least one at least trifunctional alcohol or at least one diol **to carboxyl groups** of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively,

is from 1.5/1 to 1/1.5 in order to maximize branch formation and further growth. Appellants submit that if the equivalency of hydroxyl and carboxyl groups according to the invention is not maintained a non-hyperbranched polymeric structure is obtained.

Saitoh describes a composition containing a polyfunctional urethane-modified polyester (meth)acrylate of a polyester oligomer and a plurality of (meth)acryoyl groups bonded to the oligomer (Abstract). Saitoh disclose a three-step reaction – first making a hydroxyl terminated polyester, then modifying it with a diisocyanate (column 3, line 35) so a polyurethane will be formed ("polyfunctional urethane-modified polyester", see column 2, line 27), and then the polyfunctional urethane-modified polyester is reacted with (meth)acrylic acid.

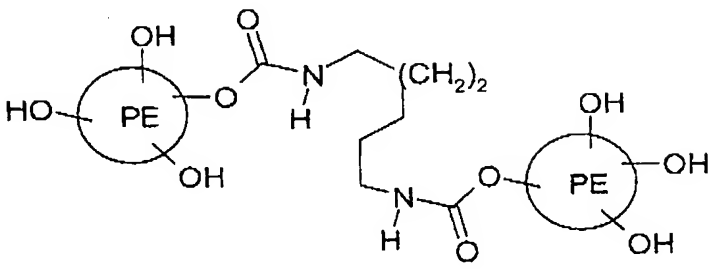
Saitoh describes that the polyester oligomer is preferably prepared from polybasic acids and polyhydric alcohols having two to four functional groups (Col. 2, lines 53-56) and also describes that a preferable equivalent ratio of the polybasic acid to the polyhydric alcohol is from 100:105 to 100:300 (Col. 4, lines 1-3). Saitoh describes that the molecular weight of the polyester (meth)acrylate may be controlled by the degree of polymerization, the selection of polybasic acid and polyhydric alcohol and the ratio therebetween (Col. 4, lines 15-19). Nowhere does Saitoh disclose or suggest a molar ratio of hydroxyl groups of an at least one at least trifunctional alcohol or at least one diol to carboxyl groups of an at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, of from 1.5/1 to 1/1.5.

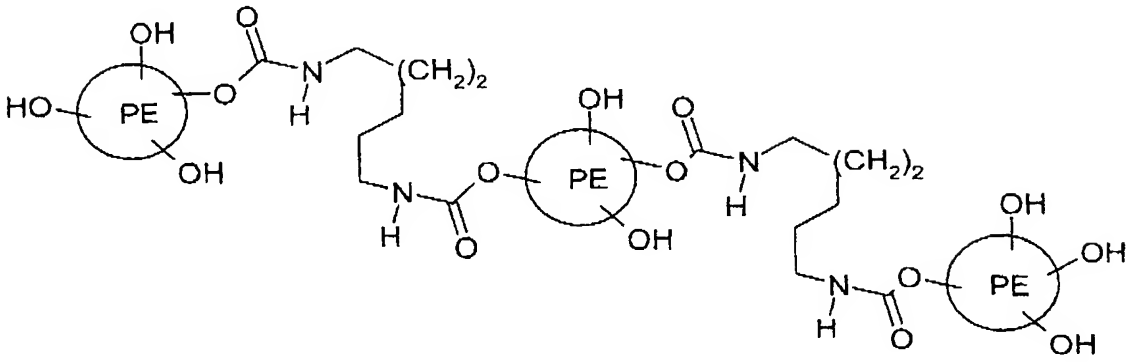
Furthermore, Appellants submit that Saitoh is silent with respect to a hyperbranched structure and does not provide guidance to produce a hyperbranched polymer as according to the claimed invention. Production Example (II) (page 7, lines 19-27) describes a condensation of trimellitic anhydride (tribasic) and propylene glycol (dihydroxy). According to the example, 0.4 equivalents (77g/192g/mole) of trimellitic anhydride are condensed with

2.39 equivalents of propylene glycol (186g/76g/mole). Accordingly, the ratio of OH to CO_2H in this example is 4:1 (2.39 x 2: 0.4 x 3), a ratio outside the range of the claimed ratio of the invention (1.5/1 to 1/1.5).

Saitoh provides no other examples of a condensation of a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol. Appellants note the Office's statement (Advisory Action dated September 21, 2010, page 2, last two lines) that; "There is nothing in the claims that excludes the additional step of chain extension with a diisocyanate." Appellants submit that the claims recite reacting at least one compound having at least one ethylenic double bond with **at least one hyperbranched polyester** to obtain the hyperbranched polyester comprising ethylenically unsaturated groups, wherein the at least one compound having at least one ethylenic double bond is **bonded to the hyperbranched polyester.** Thus, Appellants submit that such description requires reaction with the hyperbranched polyester and does not include reaction with a diisocyanate modified polyester as required by Saitoh. Moreover the claim describes that the compound comprising unsaturation is bonded to the hyperbranched polyester. This description does not include an isocyanate modified polyester described by Saitoh. Appellants again emphasize that Saitoh describes a polyester which is not a hyperbranched structure according to the invention.

Moreover, Appellants submit that analysis of the Saitoh method, i.e., stepwise formation of 1) polyester oligomer; 2) reaction with a diisocyanate; and further reaction with a hydroxyl group-containing (meth)acrylate would include formation of structures obtained by reaction at both isocyanate groups as shown in the following formulae:





Appellants submit that as the claimed invention reacts the hyperbranched polyester with a compound having at least one ethylenic double bond, diisocyanates as described by Saitoh are not components of c) according to the invention and therefore, such products are not present in the claimed hyperbranched polyester comprising ethylenically unsaturated groups.

Claim 5

As described above, the Saitoh method requires 3 steps: 1) preparation of a hydroxyl terminated polyester; 2) modification with a diisocyanate; and 3) reaction of the polyfunctional urethane-modified polyester with (meth)acrylic acid. Saitoh does not describe formation of a hyperbranched polyester and does not disclose a OH to CO_2H ratio of 1.5/1 to 1/1.5.

In contrast, the process according to Claim 5 describes preparation of a hyperbranched polyester comprising a condensation to form a hyperbranched polyester and then reaction with a compound having an ethylenically unsaturated double bond. Appellants submit that Saitoh does not describe all the elements of the claimed invention and therefore cannot anticipate the invention.

In view of all the above, Appellants respectfully submit as that Saitoh does not disclose all the elements of the claimed invention the rejection of Claims 1-5, 7-13, 15 and 16 under 35 U.S.C. 102(b) over Saitoh should be reversed.

Ground B

Rejection of Claims 1, 2, 5, 7-13 and 15-17 under 35 U.S.C. 102(b) over Meixner et al. (U.S. 4,983,712).

Claims 1, 2, 7-13 and 15-17

Meixner describes a polyester having one or more acryloyl groups based on a polyester containing a dicarboxylic acid component and a polyol component **having both dihydric and trihydric alcohols** (Abstract). Examples of the invention (1-3) described in Table 1 contain 1 mole total of dicarboxylic component (i.e., 2 mole -CO_2H), 1.2 mole dihydric alcohol (ethylene glycol) and 0.5 mole trihydric alcohol (1.2 x 2 and 0.5 x 3 = 3.9 mole OH). Therefore, the reference describes a OH/ CO_2H ratio of 1.95 (3.9/2) which is not within the claimed range of the present invention.

Appellants note the Office's discussion in section 4 of the Response to Arguments (Advisory Action dated September 21, 2010, page 3, lines 4-11) with regard to the claim description and significance of the OH/ CO_2H ratio. Appellants submit that the claimed ratio is directed to hydroxyl groups of the at least one at least trifunctional alcohol **or** at least one diol to carboxyl groups of the at least one dicarboxylic acid **or** at least one tricarboxylic or

higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5. Appellants submit that one of ordinary skill in the art recognizes that the ratio describes total OH relative to total CO_2H as adherence to this ratio this ratio is an element of formation of hyperbranched polyester structures according to the invention.

Appellants further submit that the partial OH ratio described by the Office has no significance. Meixner describes that the dicarboxylic acid mixture is reacted with the polyol component containing (D) a dihydric alcohol and (E) a trihydric alcohol (Col. 2, lines 27-36). Therefore all the OH groups, whether from component (D) or (E) are available for reaction with the CO_2H groups and it is the total ratio which will determine the formation and degree of branch formation. Appellants further submit that a hyperbranched polymer cannot be obtained with the Meixner dicarboxylic acid, dihydric/trihydric alcohol reaction mixture.

Appellants note that as described above, formation of a hyperbranched polymer structure requires branching potential at each polymer repeating unit. Meixner requires a nonbranching component, i.e., a dihydric alcohol. Each repeating unit of dyhydric alcohol cannot be a branch site and therefore, the Meixner polyester cannot be a hyperbranched structure.

Appellants further submit that one of ordinary skill in the art would recognize that due to the extreme amount of diol present in the reference polyester, twice as much as the triol, no hyperbranched polyesters could be formed. Rather, a completely alcohol-terminated polyester would be formed, with an acid number of zero or almost zero.

The Office has responded to Appellants previous remarks directed to a very low acid number in the following manner (Advisory Action dated September 21, 2010, page 4, lines 3-5):

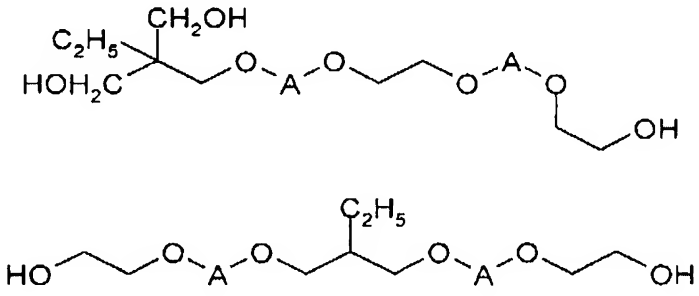
> Applicants' contention that the acid number of the polyesters will be zero or close to zero is demonstrably false; the acid numbers of polyester samples 1-3 are between 10 and 22 mg KOH/g [see Table 2].

Appellants respectfully point to Col. 4, lines 17-22 of Meixner which describes polyester formation as follows:

> In Examples 1 to 3 according to the invention and Comparison Examples 4 to 8, which are summarized in Tables 1 and 2, starting components (A), (B), (C), (D) and (E) were initially heated under nitrogen in first reaction step at 200° to 250° C. in the absence of other additives **until an acid value below 3 was attained.** (Bold added for emphasis)

Meixner further describes reacting the formed polyester with acrylic acid and it is the acid value of the acrylate polyester reported in Table 2.

Appellants submit that based upon the numbers of the reference, after the first step the following molecules will remain in the reaction composition of Meixner:



A is an integer that characterizes the hydrocarbon moiety of the diacid. In addition, starting materials such as diol may be present. Only where triol is incorporated in the chain would branch formation be possible. In view of the large excess of diol, Appellants submit that it is clear that the polyester structure described by Meixner is not hyperbranched. The Meixner structure does not have a trifunctional or higher functionality monomer in every repeating unit.

Thus, Appellants submit that Meixner does not describe the formation of hyper-branched polyesters. Accordingly, Meixner does not disclose or suggest the hyperbranched polyester comprising ethylenically unsaturated groups as according to the present invention and cannot anticipate the subject matter of the instant claims.

Claim 5

Claim 5 comprises synthesizing a **hyperbranched polyester** comprising unsaturated groups. As described above, Meixner does not disclose, suggest or inherently describe formation of a hyperbranched polyester polymer. Meixner requires the presence of both dihydric and trihydric alcohol. As described above, such a polymer structure is not a hyperbranched structure as understood by one of ordinary skill in the art.

In view of all the above, Appellants respectfully submit as that Meixner does not disclose all the elements of the claimed invention the rejection of Claims 1, 2, 5, 7-13, and 15-17 under 35 U.S.C. 102(b) over Meixner should be reversed.

Ground C

Rejection of Claims 3 and 4 under 35 U.S.C. 102(b) or in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Meixner et al. (U.S. 4,983,712).

Claims 3 and 4 are both directed to hyperbranched polyesters comprising unsaturated groups as described in each respective claim. Appellants have shown above that Meixner does not disclose or suggest a hyperbranched polyester. Additionally, a hyperbranched structure cannot be inherent because as explained above, Meixner requires a mixture of dihydric and trihydric alcohols and therefore, each polymer repeating unit cannot contain a branch site. Accordingly, Meixner does not disclose every element as described in the claimed invention and cannot anticipate the invention.

Moreover, Meixner is silent with respect to a hyperbranched polyester polymer, and requires a mixture of dihydric and trihydric alcohols. Therefore, as Appellants have described, each polymer repeating unit cannot contain a branch site and a hyperbranched structure cannot be inherent to the Meixner description. Accordingly, the claimed invention cannot be obvious over the description of Meixner.

In view of all the above, Appellants respectfully submit as that Meixner does not disclose or suggest all the elements of the claimed invention and the rejection of Claims 3 and 4 under 35 U.S.C. 102(b) or in the alternative under 35 U.S.C. 103(a) over Meixner should be reversed.

Ground D

Rejection of Claim 6 under 35 U.S.C. 103(a) over Saitoh et al. (U.S. 5,566,027).

Claim 6 describes a process for preparing a hyperbranched polyester comprising unsaturated groups wherein the polyester components are condensed in the presence of the compound having at least one ethylenically unsaturated group. A molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5.

As Apellants have described above, Saitoh discloses a three-step reaction – first making a hydroxyl terminated polyester, then modifying it with a diisocyanate (column 3, line 35) so a polyurethane will be formed ("polyfunctional urethane-modified polyester", see column 2, line 27), and then the polyfunctional urethane-modified polyester is reacted with (meth)acrylic acid.

As described previously, Saitoh does not disclose or suggest a molar ratio of hydroxyl groups of an at least one at least trifunctional alcohol or at least one diol to carboxyl groups of an at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, of from 1.5/1 to 1/1.5.

The Office alleges that (Official Action dated May 10, 2010, page 5, Section 9) Saitoh would render the present invention obvious because the reaction ingredients can be added in any order. Appellants submit that reacting all the components required by Saitoh, i.e., alcohol, carboxylic acid and diisocyanate would not yield a polyester. Polyols are known to one of ordinary skill in the art to be reactive to isocyanates and therefore would produce polyurethane structures, not polyester and not hyperbranched polyester according to the invention.

Therefore, Appellants submit that Saitoh does not make all the elements of Claim 6 known and cannot render the invention according to Claim 6 obvious. Appellants request that the rejection of Claim 6 under 35 U.S.C. 103(a) over Saitoh be reversed.

Ground E

Rejection of Claim 6 under 35 U.S.C. 103(a) over Meixner et al. (U.S. 4,983,712).

Claim 6 describes synthesizing at least one hyperbranched polyester by condensing:

a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or

b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol;

in the presence of (c) at least one compound having at least one ethylenically unsaturated double bond, wherein a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic

acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5.

Appellants have described above that Meixner requires a condensation with a dihydric and a trihydric alcohol and therefore does not disclose or suggest preparation of a hyperbranched polyester as according to the claimed invention. Moreover, Appellants have previously described that Meixner does not disclose or suggest a molar ratio of hydroxyl groups of an at least one at least trifunctional alcohol or at least one diol to carboxyl groups of an at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, of from 1.5/1 to 1/1.5.

Accordingly, Appellants submit that Meixner does not make all the elements of the invention known and cannot render the invention obvious. Appellants request that the rejection of Claim 6 under 35 U.S.C. 103(a) over Meixner be reversed.

Ground F

Rejection of Claim 14 under 35 U.S.C. 103(a) over Saitoh in view of Overbeek et al.(WO 02/32982).

Claim 14 directly depends from Claim 1 and includes all the description of the independent claim. The deficiencies of Saitoh to anticipate or render the invention obvious are described above. Overbeek is cited to show a polydispersity index value. However, Appellants submit that the secondary reference does not disclose or suggest the hyperbranched polyester comprising unsaturated groups as claimed in claim 1 and therefore does not cure the deficiencies of Saitoh as described. Accordingly, Appellants respectfully submit that the cited combination of references cannot render the present invention obvious and respectfully request that the rejections of Claim 14 under 35 U.S.C. 103(a) over Saitoh or in view of Overbeek be reversed.

Ground G

Rejection of Claim 14 under 35 U.S.C. 103(a) over Meixner in view of Overbeek et al.(WO 02/32982).

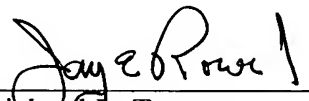
Appellants have described that Meixner cannot anticipate nor render the claimed invention obvious in previous discussion above. For the same reasons as indicated for the Saitoh-Overbeek combination above, Appellants submit that the combination of Meixner and Overbeek cannot render the present invention obvious and respectfully request that the rejection of Claim 14 under 35 U.S.C. 103(a) over Meixner in view of Overbeek be reversed.

CONCLUSION

For all the above reasons, Appellants request that all outstanding rejections of the pending claims should be reversed.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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VIII. CLAIMS APPENDIX

Claim 1 (Rejected): A hyperbranched polyester comprising

ethylenically unsaturated groups, obtained by a method, comprising:

(c) reacting at least one compound having at least one ethylenic double bond with at least one hyperbranched polyester to obtain the hyperbranched polyester comprising ethylenically unsaturated groups, wherein

the at least one compound having at least one ethylenic double bond is bonded to the hyperbranched polyester, and

the hyperbranched polyester is obtained by condensing;

(c) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or

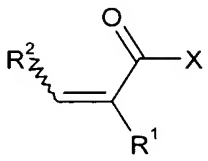
(d) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol,

wherein

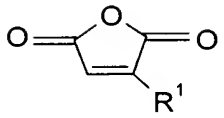
a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5.

Claim 2 (Rejected): The hyperbranched polyester comprising unsaturated groups as claimed in claim 1, wherein the at least one compound having at least one ethylenic double bond is a compound having a terminal double bond.

Claim 3 (Rejected): The hyperbranched polyester comprising unsaturated groups as claimed in claim 1, wherein the at least one compound having at least one ethylenic double bond is a compound of the formula Ia or Ib



Ia



Ib

wherein:

R^1 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, and hydrogen;

R^2 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, C_2-C_6 alkenyl, COOH, and hydrogen;

X is selected from halogen and $OR^{3;}$ and

R^3 is selected from the group consisting of C_1-C_{10} alkyl, unbranched or branched, C_1-C_{10} alkyl, unbranched or branched, with at least one functional group,

polyethylene glycol derivatives, polypropylene glycol derivatives, glycidyl, H-CO (formyl), unbranched or branched C_1-C_{10} alkyl-CO, and C_6-C_{10} aryl-CO.

Claim 4 (Rejected): The hyperbranched polyester comprising unsaturated groups as claimed in claim 1, wherein the at least one compound having at least one ethylenic double bond is selected from the group consisting of:

unsaturated carboxylic acids having 3 to 30 carbon atoms and from 1 to 5 C-C double bonds;

unsaturated alcohols having 3 to 40 carbon atoms and from 1 to 5 C-C double bonds;

unsaturated amines having 3 to 20 carbon atoms and from 1 to 5 C-C double bonds;

diol and polyol ethers in which at least one hydroxyl group is etherified with an unsaturated alcohol and at least one hydroxyl group is unetherified;

diol and polyol esters in which at least one hydroxyl group is esterified with an unsaturated acid and at least one hydroxyl group is unesterified;

vinyl esters, diene and triene monoepoxides;

unsaturated halides having 2 to 20 carbon atoms and from 1 to 5 C-C double bonds,

isocyanato (meth)acrylates; and

unsaturated halogenated silanes.

Claim 5 (Rejected): A process for preparing the hyperbranched polyester comprising unsaturated groups as claimed in claim 1, which comprises synthesizing at least one hyperbranched polyester by condensing:

c) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or

d) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol;

and then reacting the synthesis product with (c) at least one compound having at least one ethylenically unsaturated double bond,

wherein

a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5.

Claim 6 (Rejected): A process for preparing the hyperbranched polyester comprising an unsaturated group as claimed in claim 1, which comprises synthesizing at least one hyperbranched polyester by condensing:

a) at least one dicarboxylic acid or derivative thereof with at least one at least trifunctional alcohol; or

b) at least one tricarboxylic or higher polycarboxylic acid or derivative thereof with at least one diol;

in the presence of (c) at least one compound having at least one ethylenically unsaturated double bond,

wherein

a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5.

Claim 7 (Rejected): A binder comprising a hyperbranched polyester comprising unsaturated groups as claimed in claim 1.

Claim 8 (Rejected): A process for preparing a radiation-curable composition, comprising:

using one or more hyperbranched polyesters comprising unsaturated groups as claimed in claim 1.

Claim 9 (Rejected): A radiation-curable composition comprising one or more hyperbranched polyesters comprising unsaturated groups as claimed in claim 1.

Claim 10 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one dicarboxylic acid or derivative thereof is selected from the group consisting of succinic acid, glutaric acid, adipic acid, phthalic acid, isophthalic acid, terephthalic acid, monomethyl esters thereof, dimethyl esters thereof and mixture thereof.

Claim 11 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one at least trifunctional alcohol is selected from the group consisting of glycerol, triglycerol, trimethylolpropane, trimethylolethane and pentaerythritol.

Claim 12 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one tricarboxylic acid or derivative thereof is selected from the group consisting of 1,2,4-benzenetricarboxylic acid, 1,3,5-benzenetricarboxylic acid, 1,2,4,5-benzenetetracarboxylic acid, mellitic acid and derivatives thereof selected from the group consisting of corresponding anhydrides in monomeric or polymeric form and monoalkyl, dialkyl or trialkyl esters.

Claim 13 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one diol is selected from the group consisting of ethylene glycol, propane-1,2-diol, propane-1,3-diol, butane-1,4-diol, hexane-1,6-diol, diethylene glycol, triethylene glycol, dipropylene glycol, and tripropylene glycol.

Claim 14 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein a polydispersity is from 1.05 to 50.

Claim 15 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one dicarboxylic acid is adipic acid and the at least one at least trifunctional alcohol is glycerol.

Claim 16 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one dicarboxylic acid is adipic acid and the at least one at least trifunctional alcohol is trimethylolpropane.

Claim 17 (Rejected): The hyperbranched polyester comprising ethylenically unsaturated groups according to claim 1, wherein the at least one dicarboxylic acid is adipic acid and the at least one at least trifunctional alcohol is an ethoxylated trimethylolpropane having a formula of $CH_3CH_2C[CH_2(OCH_2CH_2)_5OH]_3$.

IX. EVIDENCE APPENDIX

Exhibit A: P.J. Flory., J. Am. Chem. Soc. (1952) Vol. 74, pp. 2718-2723

Exhibit B: A Sunder et al., ChemEur. J., (2000) Vol. 6, No. 14, pp. 2499-2506

Exhibit C: Rånby et al. (U.S. 5,834,118)

Exhibit D: Hult et al. (U.S. 5,418,301)

Exhibit E: Sorensen et al. (U.S. 6,093,777)

X. RELATED PROCEEDINGS APPENDIX

None